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ENTOMOLOGICAL NEWS

NOVEMBER 1956

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PUBLISHED MONTHLY, EXCEPT AUGUST AND SEPTEMBER, BY

THE AMERICAN ENTOMOLOGICAL SOCIETY

PRINCE AND LEMON STS., LANCASTER, PA.

AND

1900 RACE STREET, PHILADELPHIA 3, PA.

Subscription, per yearly volume of ten numbers: $5.00 domestic; $5.30 foreign; $5.15 Canada. Entered as second-class matter April 19, 1943, at the post office at Lancaster, Pa., under the Act of March 3, 1879. Acceptance for mailing at the special rate of postage provided for in paragraphs (d-2), Section 34.40, P. L. & R. of 1948, authorized April 19, 1943.

ENTOMOLOGICAL NEWS

ENTOMOLOGICAL NEWS is published monthly, excepting August and September, by The American Entomological Society at Prince and Lemon Sts., Lancaster, Pa., and the Academy of Natural Sciences, 1900 Race Street, Philadelphia 3, Pa., U. S. A.

PHILIP P. CALVERT, Editor Emeritus. R. G. SCHMIEDER, Editor. Editorial Staff: H. J. Grant, Jr., E. J. F. MARX, M. E. PHILLIPS, and J. A. G. REHN.

Subscription price, per yearly volume of 10 numbers: Domestic, $5.00; Foreign, $5.30; Canada, $5.15—U. S. Currency.

SUBSCRIPTIONS: Communications and remittances to be addressed to **Entomological News, 1900 Race Street, Philadelphia 3, Pa.**

ADVERTISEMENTS: Rate schedules available on request. Address, **Fred B. Jacobson, Advertising Manager, Entomological News, 1900 Race Street, Philadelphia 3, Pa.**

MANUSCRIPTS and all communications concerning same should be addressed to **R. G. Schmieder, Zoological Laboratory, University of Pennsylvania, Philadelphia 4, Pa.**

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ENTOMOLOGICAL NEWS

VOL. LXVII NOVEMBER, 1956 No. 9

Notes on the Ecology and Taxonomy of the Midge Tendipes (Tendipes) staegeri (Lundbeck)— Chironomus staegeri Lundbeck (Diptera)

By LAVERNE L. CURRY, Central Michigan College, Mount Pleasant, Michigan

Up to the present time it has been very difficult, if not impossible, for the average field worker to determine the immature forms of many of the fresh-water midges, especially those of the subgenus *Tendipes*. This difficulty is due, in part, to the lack of literature describing these forms and to confused determinations of both adult and immature stages. For these reasons the larva of *Tendipes staegeri* (Lundbeck) is difficult to recognize today.

The species has a history of confusion. It was represented in the series on which Staeger (1845) based his description of *hyperboreus*. Lundbeck (1898) recognized the distinctions of this species and described it as *staegeri*. Since that time, additional erroneous determinations have been published. Malloch (1915) identified adults of *staegeri* as *riparius* Meigen, which he then synonymized with *fasciventris* Malloch. Eggleton (1931) reported *C. fasciventris* and gave notes on its biology. Johannsen (1937) described pupae which were apparently obtained from samples taken by Eggleton from a lake in Washtenaw County, Michigan.

However, Malloch (1915) recorded that some error had been made earlier in the observations of F. M. Van der Wulp (1874) and H. Weyenbergh (1874). Their descriptions of the larva do not agree with that given more recently by Johannsen (1937) as *C. fasciventris*. It is the purpose of this

paper, then, to clarify the descriptions of all stages of *T. staegeri.* Further, a method is introduced for the identification of larvae in the genus *Tendipes,* which is simpler than that employed in existing keys of this genus.

Methods

Larvae of this species were collected from several aquatic habitats in Michigan by Ekman dredge during the summer of 1955. They were brought into the laboratory and placed in trays cooled in a tank of running water. Water in the tank had a temperature of about 15° C., while that in the tray was about two to three degrees higher. Experience showed no need to maintain temperatures within narrower ranges. Greater variations in tank and laboratory temperatures, up to 20–25° C., caused a high mortality in both the larval and pupal forms. As the pupae formed they were placed in rearing containers consisting of a small baby food jar inverted over a larger one. The method varied but slightly from that recorded by the author (Curry, 1954). About 50 c.c. of water was taken from the rearing pans and placed in the jars for the pupae. The container was then partially immersed in running water in the pupae tank where the temperature was about 18° C. Emerged adults were isolated by inserting a filter paper between the upper and lower jars. Adults were kept alive for 24 hours to permit development of mature coloration, then killed by fumes of carbon tetrachloride and mounted on minuten pins. All cast larval skins, puparia, and larval cases when found, were preserved in 70% alcohol when positively associated with their adults. The mounting technique is a modification of that described by Townes (1945). The casts and larval cases were run up through 100% alcohol, xylol, and mounted in balsam on the slide with the adult male genitalia. Care was exercised to observe that the comb, bar, and plate had uniform orientation. The male genitalia were removed by cutting the penultimate abdominal segment, and were then cleared in 10% KOH, washed in water, then 100% alcohol, cleared in xylol, and mounted in balsam. Legs and antenna were mounted in balsam

on the slide only when necessary. The adult was then determined, and the series completed.

Acknowledgments: I am indebted to the Atomic Energy Commission for financial aid supporting the study on which this paper is based. I am also indebted to the following: Mr. Gale R. Gleason, Jr. and Miss Sue Zahn Mitchel for preparation of material; Miss Shirley Clarke for typing; Miss Marilyn Miller and Mr. Richard Martens for preparation of certain plates; Dr. Justin W. Leonard, Michigan Department of Conservation, for critical reading of the manuscript; Professor Byron Clendening for photographs; the University Zoological Museum, Copenhagen, Denmark, for supplying study material of *Tendipes hyperboreus* (Staeger); and Drs. Allan Stone and Willis W. Wirth, Smithsonian Institute, Washington, D. C., in checking determinations of the several stages of *T. staegeri.*

Ecology

The larvae of *T. staegeri* have been identified from dredgings taken from several lakes and a pond in central Michigan. The depth ranged from 1 to 16 inches in the pond to 52 feet in the deepest lake. The deepest record for the benthos was found in Big Silver Lake, Clare County, Michigan. The bottom deposit at the collecting site was composed of silt with occasional bits of macroscopic plant detritus. The larvae were found more or less concentrated near the center of the lake.

Larvae were also found in a "concentration zone" 8–10 feet wide at a depth of 13 to 20 feet in Campau Lake, Isabella County, Michigan (Curry, 1952. Unpublished doctoral thesis). The larvae were associated with those of other midge species including *T. tentans, T. riparius, T. plumosus* and a few *T. decorus.* Algae (*Phormidium* sp.) and ciliate protozoa (*Ophrydium* sp.) were also concentrated here. This zone was located at the base of a drop-off which was covered by a dense mat of *Chara* sp. The bottom deposit in which the "concentration zone" was located was similar to the *gyttja* deposits of Scandinavian lakes as described by Ruttner (1953). This specific hydrosol was composed of particulate marl with a glue-

like texture. Intermixed within this deposit were micro- and macroscopic bits of plant detritus. Small twigs, leaves and cones of tamarack (*Larix*) made up a major portion of the macroscopic detritus. Of the animal remains, snail shells made up the greatest percentage. Some silt was evident, especially in the upper one-half inch of the particulate marl.

The larvae taken from the millpond were found at depths from 1 to 16 inches. The bottom deposit was composed of silt, pulpy peat, and plant detritus in the form of partly decomposed leaves and stems. The aquatic plants, *Ceratophyllum* sp., *Potamogeton* sp., and *Vallisneria* sp., were growing at this sampling site.

Larvae were also identified from dredge samples taken at depths of 3 to 6 feet in the littoral zone of Coldwater Lake, Isabella County, Michigan (Curry, 1952). The bottom deposit in this area was composed of microscopic bits of marl and silt. Intermixed in the hydrosol were macroscopic bits of marl derived from snail shells and stems of *Chara*. The larvae formed their tubes from the silt at the base of clumps of *Chara* sp. which grew sparsely in the littoral zone at the south end of the lake. Eggleton (1931) also recorded this species from depths of 19 to 59 feet, it being most numerous at depths of 19 to 39 feet. The bottom deposit was composed of mud. Eggleton also found the species associated with the larvae of a similar midge, *T. utahensis*.

The cases observed were constructed from the silt within the bottom deposit. They were very flimsy and disintegrated easily when handled. Cases from the deeper portions of the lakes were more delicate than those obtained from the littoral zone. The tubes were approximately 25 mm. long and 2 mm. wide, and were obtained by screening.

Swarming and Oviposition

Egg masses were never collected in this investigation. However, egg-laying flights of females and swarms of males were observed to have formed as early as 4:00 P.M. on Campau Lake as compared to the early evening flights of *T. plumosus*

described by Needham (in Hankinson, 1908). The swarms were 7 to 15 feet above the lake surface. Characteristically, they would make horizontal sweeps up to 30 feet, after which they would drift to near their starting place. These flights, most numerous in late afternoon and evening, were observed even on moderately windy days as the lake was protected by a growth of cedars to its margin. Females were observed to enter the swarm, pair off with a male, then to leave the mass of insects, copulating while in flight. After copulation the female either flew to adjacent shrubbery, or to the surface of the water to oviposit, and the male returned to the swarm. No information was obtained regarding the number of times a single male copulated with females entering the swarm.

The restricted area in which the adult midge is able to copulate and oviposit is illustrated in the following controlled rearing condition. Larvae of *T. decorus* were placed in finger bowls 10 cm. in diameter. The bowls were filled with water one inch deep and covered with a bell jar 15.5 cm. in diameter by 21 cm. high. One male and one female adult emerged from the larvae. Copulation and oviposition by the female took place in the small space. Egg masses were found deposited on the edge of the finger bowl below the water surface.

The egg masses were 1 to 2 mm. in diameter and 20 mm. long. The egg masses were much longer and narrower than those described by Branch (1931). A gelatinous string was attached to one end, the other end being quite blunt. To the string, which was quite extensible—being capable of being stretched up to 5 cm.—a gelatinous disc was attached. The larvae were collected on April 10, 1951; adults emerged and eggs were laid 14 days later. It required 4 days for all the eggs to hatch.

Larva

The immature stages of *T. staegeri* have been associated in a previous study (Curry, 1952). Adults were reared in the laboratory from larval samples dredged from a small dystrophic lake, the hydrosol of which has been previously described in this

paper. Larval and pupal exuviae and the hypopygium for each adult were mounted on slides. The adults were pinned on minuten pins, and the immature stages were then associated through adult male determinations based on Townes (1945).

Tendipes staegeri larvae are blood red in color and possess two pairs of ventral blood gills. A lateral gill-like process is present on the margin of the tenth abdominal segment.

The anterior portion of the head capsule is almost as broad as long, and rounded. There are two pairs of black eye spots which are vertically paired and reniform in shape, but show some variation, at times being circular. The individual eye spots are separated by a distance greater than the diameter of either.

In making larval determinations the head is mounted ventral side up to reveal the morphological features employed in contemporary keys. One conspicuous structure thus exposed is the labial plate (fig. 2e). The form of the labial plate of *staegeri* serves to place it in the genus *Tendipes* since it has a typical trilobed middle tooth as do *T. hyperboreus* and *T. tentans* (figs. 1e and 3e).

For species determinations, it is believed that larvae can be identified by using the combination of characters presented by the epipharyngeal apparatus and labial plate. Under proper light the *comb, bar,* and *plate* (fig. 2b, c, d, fig. 9 a, b, c) can be seen. The comb, a chitinized armature attached to the roof of the mouth at the junction of the labrum and epipharyngeal area, is the "anterior comb" of Needham (in Hankinson, 1908). The bar is Needham's "anterior cross bar." The plate, a small median lobe on the posterior surface of the labrum, is Needham's "posterior comb." It may or may not bear teeth. In addition, the underside of the labrum bears the usual spines and bristles.

As stated above, the labial plate serves to place the larva in the genus *Tendipes.* In the case of *T. staegeri,* the tri-lobed middle tooth is generally wider than high with the lateral teeth distinctly separated from the median tooth (fig. 2e). Variations occur in the width and height ratio of the tri-lobed tooth for each species. Some larval forms of *T. staegeri* which were examined had the tri-lobed tooth narrower and higher than is found in *T. tentans* (fig. 3e).

If the epipharyngeal plate of *T. staegeri* (fig. 2d, 9c) is observed by critical light it will be found to differ from the other species of *Tendipes*. This plate is believed to be characteristic of *T. steageri*. The plate is long and narrow. It bears 13 rather short, sharp teeth along the posterior border. The teeth vary in length along the plate. Careful focusing brings out a narrow transverse band of light which is detected near the base of each tooth (fig. 9c). It has been found that the teeth are considerably thicker at their bases than at their apices. About midway from the base of each tooth the thickness is reduced considerably. Some specimens have the thickness reduced more in the center of each tooth than is illustrated in fig. 9c. It is in this region that, due to refraction, the narrow band of light is observed.

The teeth of the epipharyngeal plate of *T. hyperboreus* (fig. 1d and fig. 10c) are narrower and more blunt at their apices. There is an occasional large tooth in the plate. Further, the plate is decurved in the center. The epipharyngeal plate in *T. tentans* (fig. 3d and fig. 11c) has teeth which are short and stouter than *T. hyperboreus,* and lack the distinct differentiation in thickness of *T. staegeri*. Some specimens of *T. tentans* will have the sides of the teeth uniformly parallel and with blunt ends.

The comb of *T. staegeri* (fig. 2b and fig. 9a) when in proper position to be viewed is depressed in the center and decurved toward the ends. The ends may or may not be recurved. *T. hyperboreus* has a comb (fig. 1b and fig. 10a) with a greater curvature in the center, whereas *T. tentans* (fig. 3b and fig. 11a) is similar to *T. staegeri*. The bars for each species are slightly decurved, and when viewed vertically are as narrow at the base as at the center. The ends are closely adjacent on the median line. The bars for each species are enlarged in figs. 9, 10, and 11 for comparison.

The mandible (fig. 4) is 0.4 mm. long, being twice as long as wide. All the teeth are black, except a pale dorso-mesal tooth. The accessory tooth is short and ochraceous in color. A compound brush is present and there are 11 bristles in the preapical comb. The premandibles (fig. 5) have two short,

rounded digits. The antenna (fig. 6) is 16 mm. long and the segments bear the ratio of 100:30:12:10:6 to one another. The blade is located at the base of the second segment and extends to the base of the fourth segment. A pair of small Lauterborn organs are located at the base of the third segment. The ring organ is located beyond the basal third of the first segment.

Some measurement data for length increment of *T. staegeri* have been recorded in a previous study (Curry, 1952). From these measurements it is estimated that *staegeri* has two emergences per year. Percentages of individuals within specific length classes were obtained from a larvae sample taken on June 21, 1950. The distribution of lengths is listed in the following table:

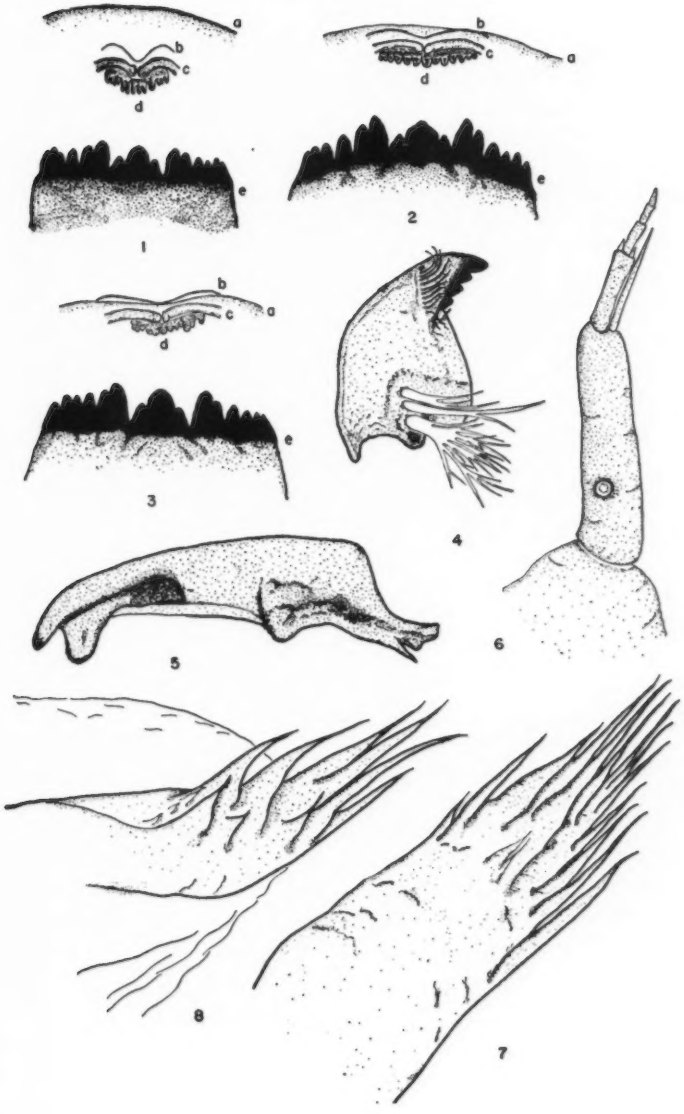
Length in millimeters	10	11	12	13	14	15	16	17	18	19
Number of Individuals	6	9	17	32	55	54	26	31	7	2
Percentages	2.5	3.7	7.1	13.3	23.0	22.5	10.8	12.9	2.9	0.8

From the above figures it appears that the larvae attain an average length of 14–15 mm. prior to pupation. Pupal transformation occurs in larvae having lengths of 15–17 mm. This fact was easily observed when sorting larvae as more individuals 15–17 mm. long had enlarged anterior segments than did the longer larvae. Of larvae taken on April 26, 1950, 25.8% had a length of 14 mm.

EXPLANATION OF PLATE

1. Mouth parts used to identify *Tendipes hyperboreus* (Staeger).
2. Mouth parts used to identify *Tendipes staegeri* (Lundbeck).
3. Mouth parts used to identify *Tendipes tentans* (Fabricius).
4. Mandible of *Tendipes staegeri.*
5. Premandible of *Tendipes staegeri.*
6. Antenna of *Tendipes staegeri.*
7–8. Spur on eighth abdominal segment, *T. staegeri* pupa.

a, margin of labrum
b, comb
c, bar
d, plate with teeth
e, labial plate


a
b
c
d
e
1
2
3
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6
7
8

Pupae

The pupa has been described briefly by Johannsen (1937). One pupal case preserved in the author's collection is 14 mm. long as compared to 10 mm. as listed by Johannsen. Spurs were also found on segment 8. However, one pupa had a spur composed of 13 fused spines (fig. 7), and another of 9 spines (fig. 8), as compared to 8 by Johannsen. This variation is believed to be due to the development of the spines within the spur of the puparium. Three partially developed spines can be seen along the lateral border of the spur (fig. 8). There are over 100 filaments in the fringe of the lobe of segment nine.

Adult

The adult has been described by Townes (1945, 1952). The ground color is a light pruinose brown, often with a greenish tinge when alive. The pedicel, flagellum except the base, clypeus, and mouthparts are dark brown. Additional dark brown markings are found on the thorax and tergites of the abdomen. Wing length varies from 4.8 to 5.7 mm. The fore tarsus is about ⅓ longer than the fore tibia with a short beard on its outer side, the hairs appressed all in one plane; mid and hind legs with long hairs only. Townes considers the short beard, all on the outer side of the tarsus, as distinctive.

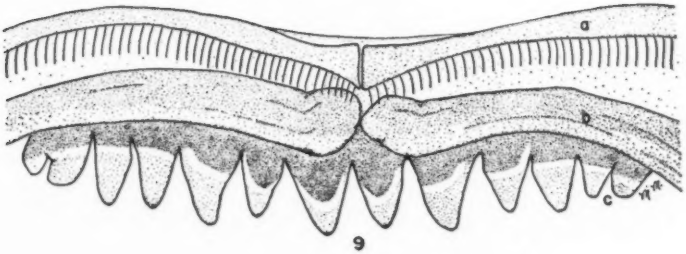
Geographical Distribution

Townes (1945) lists the following distribution for the species. Greenland, North West Territories, British Columbia, Ontario, Manitoba and Labrador. On the Atlantic Seaboard from Massachusetts, New Hampshire and New York, south to Washington, D. C., and North Carolina, westward through the central states including Pennsylvania, Michigan, Illinois, Minnesota, South Dakota, Missouri, Iowa, Kansas to Washington and as far south as Louisiana.

EXPLANATION OF PLATE

9. Mouth parts used to identify *Tendipes staegeri.*
10. Mouth parts used to identify *Tendipes hyperboreus.*
11. Mouth parts used to identify *Tendipes tentans.*

a, comb b, bar c, plate with teeth



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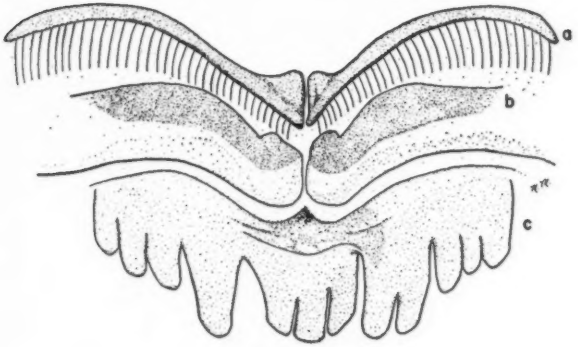

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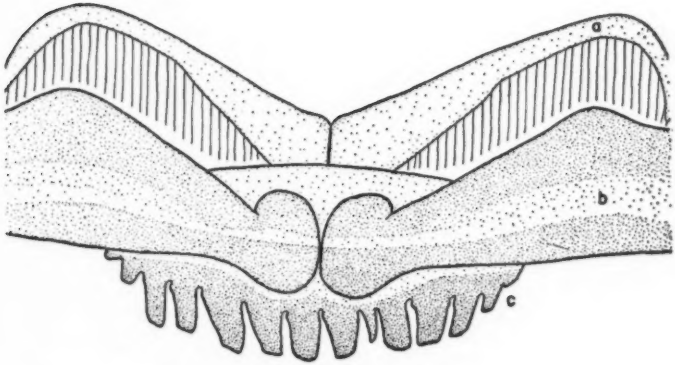

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Seasonal Distribution

Adults of *T. staegeri* were collected from April to October in Isabella County, Michigan. From length increment data obtained from larval collections taken over a two-year period it is believed that there are two generations per year. Townes (1945) lists collecting dates for the adults as March 3 in North Carolina; March 28 in British Columbia; April 1 in Montana; April 5 in Iowa; May 3 in New Hampshire and September 15 in New York.

Summary

Collecting and rearing procedures for larvae of *T. staegeri* are described. A description of the larva is provided in an attempt to clear up existing confusion with those of several other species of the subgenus *Tendipes*. Characters of the epipharyngeal comb, bar and plate believed to be specific for *staegeri*, are described. *T. staegeri* is a rather common species in the northern parts of the United States and Canada. It is found throughout the growing season.

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A New Genus and Species of Naucorid from South America (Hemiptera)

By Ira La Rivers [1]

Subfamily Naucorinae (Stål) 1876

Division *Naucoraria,* Stål, 1876: 142. Subfamily *Naucorinae,* Montandon, 1897: 125; / 1909A: 55; / 1909B: 316. Subfamily *Naucorinae,* Champion, 1900: 360. Subfamily *Naucorinae,* Bueno & Brimley, 1907: 434. Subfamily *Naucorinae,* Van Duzee, 1917: 457. Subfamily *Naucorinae,* Usinger, 1937: 299; / 1941: 8. Subfamily *Naucorinae,* La Rivers, 1949 (1948): 371; / 1953: 84.

PLACOMERUS genus novum [2]

The characteristics of *Placomerus* which distinguish it from the genus *Pelocoris,* which it superficially resembles, can be conveniently set forth in couplet form:

Propleura not raised from the prosternal floor, and not free from the prosternum, about on an even plane with the tubular median sclerite which lies posterior to the prosternum. Legs robust. Mesofemora greatly flattened dorso-ventrally, their dorso-posterior [3] margins extended into thickened, flap-like projections and equipped with fine brush; as a consequence of this dorso-posterior marginal elongation caudally, the ventro-posterior margin is offset cephalad and appears as a line of prominent but short, thickly set reddish spines; mesofemoral widths always more than 30% of their lengths. Mesotibiae short and stout, their widths always more than 20% of their lengths; no suggestion of definite transverse rows of spines at distal tips, the spination here the same as that occurring over remainder of tibiae. Metafemora not proportionately as broad as those of the midlegs, their widths always, however, more than 25% of their lengths; no distinctive transverse terminal spination. Meso- and meta-coxae, particularly the former, with large, weakly curved reddish spines. Meso- and meta-trochanters, particularly the former, with distinct

[1] Biology Department, University of Nevada, Reno.

[2] πλάξ, *flat* and μηρός, *thigh,* referring to the characteristically flattened construction of the middle and hind legs.

[3] Leg oriented at right angles to the long axis of the body.

angulations at postero-lateral corners, breaking an otherwise smooth union with the corresponding faces of the femora. Metalegs with femora longer than tibiae. Tarsi of meso- and meta-legs (with claws) longer than their corresponding tibiae. Male basal edeagal plates complex in full outline (see illustration). Female first valvae broad at base, narrowing rapidly to long, tooth-like, slightly incurving, points; second valvae united into a long, narrow, organ equipped with short, blunt tubercles along lateral margins, and with irregularly spaced median tubercles, all placed toward the tip (genotype *Placomerus micans*) ..... *Placomerus*

Propleura raised and free from the prosternal floor at postero-internal margins, the tubular median sclerite posterior to the prosternum, as a consequence, having a sunken appearance. Legs slim. Mesofemora not flattened or margined as described for *Placomerus;* mesofemoral widths never 30% of their lengths. Mesotibiae long and slim, their widths never 20% of their lengths; as in the genus *Ambrysus,* and others, the distal tips always have one or more distinctly characteristic transverse terminal rows of spines, thickly set across the tibiae which contrast with the usual longitudinal spination present along the tibial lengths. Metafemoral widths never 25% of their lengths. Meso- and meta-coxae with tiny reddish spines, reduced in size so as to be little else than tubercles. Meso- and meta-trochanters with no conspicuous angulation at postero-lateral corners, forming an essentially smooth outline at their union with the posterior margin of the femora. Metalegs with femora shorter than, or subequal in length to, the tibiae. Tarsi of meso- and metalegs (with claws) shorter than their corresponding tibiae. Male basal edeagal plates simple in full outline (see illustration). Female first valvae non-toothlike, being moderately broad thin structures, heavily spined on their external (ventral) convex surfaces; second valvae united into a broad, flat organ only microspinulate (genotype *Pelocoris femoratus* (Palisot de Beauvois) 1805) ..... *Pelocoris*

From *Ambrysus,* the only other major genus in its area, *Placomerus* can be separated on a number of points. The superficial, but traditional setting of the posterior part of the head into a corresponding well in the median anterior outline of the pronotum will set *Ambrysus* apart from *Placomerus* in the great majority of cases, but it is now apparent that this characteristic will have to be abandoned as a means of diagnosis for

the genus *Ambrysus* since some material is known in which this does not hold true. More specific but less well known differences involve the genitalia, as in the cases of *Placomerus* and *Pelocoris* above. The male basal edeagal plates of *Ambrysus* are generally simple in outline, but in some South American species become more complex in that the plate may become almost horseshoe-shaped. However, no known Ambrysi approach *Placomerus* in basal edeagal plate structure.

In the case of the female differences, the first valvae of Ambrysi generally are more like narrow versions of the *Pelocoris* first valvae and bear no resemblance to the construction of these organs in *Placomerus*. The same holds true for the second valvae. And finally, the legs of Ambrysi are essentially indistinguishable from those of *Pelocoris,* and so immediately differentiated from *Placomerus* legs.

The genus *Cryphocricos* in this area is so divergent from the above types that comparative notes are superfluous.

Oddly enough, in casting about for relatives of *Placomerus,* an European genus stands out as exhibiting more of the typical features of these small naucorids than any other group known to me. While *Placomerus* is, from the dorsal surface, a *Pelocoris* at first glance, attention to the ventral and genitalic details shows a pronounced incongruity existing between *Placomerus* and all its American naucorid congeners, most decided in the case of the legs, which exhibit none of the proportions or details of other American species.

Ilyocoris cimicoides (Linnaeus) is a large naucorid averaging 13–14 mm. in length and widespread in the palearctic. It is currently placed in the subfamily Naucorinae, where probably neither it nor *Placomerus* belong.[4] Despite the disparity in size, which is not important, these two genera resemble each other more closely than either does anything else in the family on the following points:

[4] Evidence is accumulating to suggest that there is less basic difference between the genera *Pelocoris* and *Ambrysus* than previously thought —these two seem to be more closely allied to each other than do other elements in the Naucorinae as now accepted. It is more logical to place *Ambrysus* in the Naucorinae than it is to retain *Ilyocoris* there.

(1) Proportions of the labrum (longer in relation to width than is the case in *Pelocoris*);
(2) Structure of the prothoracic ventra (propleural-prosternal relationships, less pronounced prosternal ridge, etc.);
(3) Proportions and spination of the legs (the most striking agreement);
(4) Narrowness of the pronotum (i.e., along the lateral axis).

No relationships can be postulated, with my present material, either between these two genera, or others, on the basis of male genitalia. The basal edeagal plates of both *Placomerus* and *Ilyocoris* are complex in different patterns. In the matter of accessory female structures, *Placomerus* stands pretty much alone in the shape of its first valvae; these structures are quite similar between *Pelocoris* and *Ilyocoris*. *Placomerus,* it can be suggested, probably lays its eggs in plant tissues or in tight cracks in submerged vegetation, while the other two genera appear to have ovipositors so constructed as to make the insertion of eggs into plant tissues difficult. *Naucoris* likewise shows close agreement with *Pelocoris* and *Ilyocoris* in the matter of the first and second female valvae, the specimens I have dissected being broader versions of *Pelocoris* in this respect. However, the above remarks anent relationships are still only tentative, since a great deal more needs to be known about the comparative anatomy of these naucorids before conclusions could be reached.

Placomerus micans species novum

General appearance: A small species, 6.5–7.0 mm. long and 3.5–4.0 mm. wide, only very slightly larger than *Pelocoris minutus* Montandon 1895. Predominantly a dark colored species, somewhat lighter anteriorly, highly polished overall and strongly convex.

Head: Yellow-brown in color, profusely brown-dotted. Eyes convergent posteriorly and anteriorly (i.e., inner edges curved), with no suggestion of elevation above the plane of the head sur-

face when viewed obliquely from behind; lateral and posterior edges of eyes forming perfectly smooth, curving unions with no suggestions of angulation. Labrum wider than long, triangular-shaped and merging to a broad point in front; length-to-width ratio 25: 50 (50%), whitish-yellow in color. Mouthparts darkening toward tip. Antennae short, undistinctive, three-segmented. Head ratios are:

(1) Total length to width (including eyes) 35: 58 (60%)
(2) Anterior distance between eyes to posterior distance 23: 30 (77%)
(3) Anterior distance between eyes to inner eye length 23: 30 (77%).

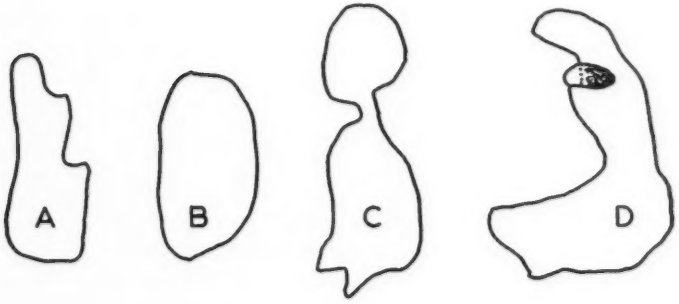

FIGURE 1

A. Basal edeagal plate of *Placomerus micans,* holotype.
B. Basal edeagal plate of *Pelocoris femoratus.*
C. Basal edeagal plate of *Ilyocoris cimicoides.*
D. Basal edeagal plate of *Naucoris* sp.

Pronotum: Comparatively long, glossy, convex, the lateral edges smooth and non-pilose; background color light yellow, surface profusely brown-spotted, the dotting more concentrated centrally, each dot the seat of a shallow puncture; lateral edges very narrowly margined; antero-lateral angles sharp, postero-

lateral angles blunt; lateral curvature slight. Venter whitish-yellow with four brown areas; keel lower than head keel, the two keels forming a distinct discontinuity, with the posterior end of the head keel accordingly appearing elevated; propleura fused to prosternum. Pronotal ratios are:

(1) Width between anterior angles to width between posterior angles 60: 85 (71%)
(2) Median length to greatest width 35: 85 (41%)
(3) Distance between anterior and posterior angles on same side to perpendicular distance between anterior angle and baseline of pronotum 43: 43.

Scutellum: Uniformly reddish-yellow in color, with brown-dotting; ratio of three sides, anterior and two laterals, is 50: 38: 38.

Hemelytra: Deep reddish-brown to blackish in color, polished, white-punctured, lighter in color on embolia. Embolium long, narrow, rather markedly widened posteriorly, with the posterior margin slanting off oblique-caudad to the lateral edge; embolium not inflated, the lateral margin smoothly and weakly curved; length to width (latter measured at broadest point posteriorly), 52: 15 (30%); lateral emboliar edge narrowly margined, surface otherwise smooth and unbroken. Hemelytra attaining abdominal tip and moderately exposing the broken, spinose, connexival outline; region of the claval sutures smooth and unbroken, the sutures themselves visible only as very faint lines. Hindwings vestigial, non-functional, extending posteriorly only to the junction of abdominal segments I–II.

Venter: The prothoracic venter has been discussed above. Venter yellowish colored, that of the abdomen only slightly darker than remainder. Connexival margins broad, progressively spinose from front-to-rear, the postero-lateral angle of abdominal segment I being smoothly appressed against the antero-lateral angle of segment II and accordingly non-spinose; postero-lateral angle of II is slightly protuberant and spinose, that of III moderately so, while IV bears the most prominent spine of all. Abdomen rather strongly, but not sharply, keeled.

The terminal outline of the female subgenital plate is rather distinctive, unlike the same structures in *Pelocoris;* the plate is relatively narrow, somewhat resembling, in this respect, that of *Ambrysus vanduzeei* Usinger, 1946, tapering from a wide base to a narrow, slightly concave tip; the flanks of the plate near the tip bear each a subsidiary point breaking the otherwise smooth lateral outlines (see illustration). There is no sugges-

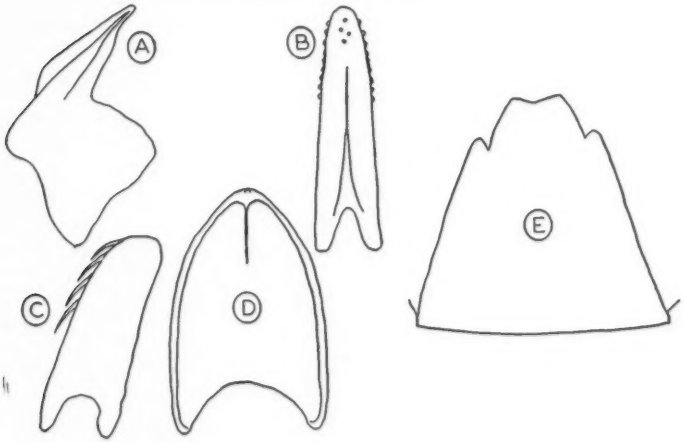

FIGURE 2

A. Right first valva of *Placomerus micans,* allotype, showing valve in lateral view.
B. Fused second valvae of *Placomerus micans,* allotype, dorsal view.
C. Right first valva of *Pelocoris femoratus,* showing valve in lateral view.
D. Fused second valvae of *Pelocoris femoratus,* dorsal view.
E. Subgenital plate of *Placomerus micans,* allotype.

tion of a male genital process on the right lobe of the 5th tergite. Male edeagus long, narrow, pointed, typically and undistinctively leaning to one side; basal edeagal plates complex (see illustration), similar. Female first valvae very distinctive, their construction readily separates *Placomerus* from all related naucorids known to me (see description under generic synopsis above, and also illustration); second valvae fused into a long,

narrow, heavily sclerotized organ set with short, blunt, spine-like tubercles along each lateral margin and with irregularly spaced, median tubercles.

Legs: Forelegs yellowish to greenish. Coxae prominent, elongate. Femora markedly incrassate, flattened, ratio of length-to-width 115: 68 (60%). Tibiae long, slender, brownish, curving weakly to their single-segmented tarsal points, tibiae-tarsi, when closed, not attaining basal end of femur. Tarsi relatively long compared with most naucorids whose forelegs are of this exaggerated incrassate type.

Midlegs: Coxae-trochanters conspicuous and long. Femora generically distinctive, much more flattened than in the genera *Pelocoris* and *Ambrysus,* to name two, and with the dorso-posterior margin flattened into rather flap-like caudal areas medially, areas which are equipped with thick brushes of short pile; the more normal ventro-posterior margins of femora beset with short, reddish spines; ratio of length to width 120: 48 (40%), length 1.6 mm. Tibiae distinctively greenish in my specimens, short, stubby, thickly beset with long, reddish spines along margins, spines which may be nearly half as long as the tibiae; a shorter row of spines is borne at each tibial tip; ratio of length to width 72: 20 (28%), length 1.0 mm. Tarsi long, narrow, greenish, each tipped with two light amber, nearly straight claws, and with moderate spination below; each tarsus three-segmented, the first segment basal and small.

Hindlegs: Broadly similar to the midlegs in general conspectus and color. Femoral ratio of length to width 138: 44 (32%), length 2.0 mm.; dorso-posterior margins normal, not flattened and prolonged as in midfemora, both dorso- and ventroposterior edges carrying short, reddish spines. Tibial ratio of length to width 122: 22 (18%), length 2.0 mm. Tarsi similar to midtarsi, but much larger.

Material examined: Holotype male, PARAGUAY, Paso-Yobay, Villarrica; *allotype* and 17 *paratypes* from the type locality, collected by F. H. Schade during February, 1952 (from the author's collection); five paratypes from BOLIVIA, Santa Cruz, collected by J. Steinbach (Univ. Kansas collection); three para-

types from BRAZIL, Pirassununga, in the State of Sao Paulo, collected by H. Keerekoper in 1941 (No. 313b, Univ. Kansas collection); two paratypes from BRAZIL, Itaquaquecetaba, collected by W. O. Townsend during July, 1933 (Univ. Kansas collection).

Location of types: Holotype and allotype in the entomological collection of the California Academy of Sciences, San Francisco, California. Remaining 17 paratypes from the type locality as follows: Ten in the collection of the writer, Reno, Nevada; two each in the Snow Museum of the University of Kansas, Lawrence and in the collection of Robert L. Usinger, Berkeley, California; one each in the collections of the United States National Museum, Washington, D. C.; American Museum of Natural History, New York, N. Y.; British Museum (Natural History), London, England. Four paratypes from Bolivia (above) in the Snow Museum, University of Kansas, and one in the writer's collection. Two paratypes from Brazil (Pirassununga) in the Snow Museum and one in the writer's collection. Two paratypes from Brazil (Itaquaquecetaba) in the Snow Museum.

Etymology: From the Latin *micans* meaning "sparkling" or "glittering," in allusion to the high degree of dorsal polish.

Acknowledgment: I should like to express my appreciation for the aid given this study by Dr. W. E. China and Dr. R. J. Izzard of the British Museum of Natural History. Their comparison of my material with British Museum types has been most helpful.

Nomenclature Notice

All comments relating to the following should be marked with the Commission's File Number and sent to Francis Hemming, 28 Park Village East, Regent's Park, London N.W.1, England.

Campsicnemus Haliday, 1851, validation of (Class Insecta, Order Diptera) (File: Z.N. (S) 1080).

For details see Bull. Zool. Nomencl. Vol. 12, Part 6.

Nomenclature of Sternochetus mangiferae (F.), the Mango Weevil (Coleoptera, Curculionidae)

By Rose Ella Warner, Entomology Research Branch, Agricultural Research Service, U. S. Department of Agriculture

The mango weevil, originally described from India, is a serious pest of mango, especially in Hawaii. It now inhabits all mango-growing regions which border the Indian Ocean, the East Indies, Philippines, Madagascar, Labuan (Island off North Borneo), and South Africa. Different technical names have been applied to the species, but at present it is called *Cryptorhynchus mangiferae* (F.) by most workers. Its correct name, not generally adopted, appears to be *Sternochetus mangiferae* (F). The following facts form the basis for this conclusion.

In 1807, Illiger, Magazin für Insektenkunde VI, p. 330, established the genus *Cryptorhynchus* for a number of species, without designating a type. The basis for the change in interpretation of *Cryptorhynchus* and its emendation *Cryptorrhynchus* is the fact that Latreille in 1810 designated "*pericarpius* Fab.," which is identical with *pericarpius* L., as genotype of *Cryptorhynchus*. This is discussed by Pierce in Proc. Ent. Soc. Wash., Vol. 21, No. 2, Feb., 1919, p. 25. The species *pericarpius* L. belongs to the subfamily known as Ceutorhynchinae (or Ceutorrhynchinae); therefore the generic name *Cryptorhynchus* Ill., 1807, should be transferred to this subfamily. Such a procedure is in accord with the Rules of Zoological Nomenclature, though the change is not acceptable to most workers, who continue to use *Cryptorhynchus* (*Cryptorrhynchus*) for *mangiferae, lapathi,* and allied species.

As to the use of *Sternochetus* (not *Sternochestus* and not *Sterrochaetus,* as it is misspelled in Proc. Hawaii. Ent. Soc., Vol. 6, No. 2, July 1926, p. 293), Pierce, in his "Manual of Dangerous Insects * * *," U. S. Dept. Agr., pp. 143–144, figs. 71–72, issued Aug. 1917, validated this name. Pierce placed *Curculio mangiferae* F. and *Curculio gravis* F. in *Sternochetus* and also indicated that these were formerly placed in *Cryptor-*

hynchus. Buchanan, Proc. Ent. Soc. Wash., Vol. 41, No. 3, Mar. 1939, designated *mangiferae* F. 1775 (Syst. Ent., p. 139) as genotype of *Sternochetus* Pierce, 1917. Unless the Rules are suspended, a change of generic name seems unavoidable. As a search of literature has failed to reveal an earlier name, *Sternochetus* Pierce, 1917, is to be used for both *lapathi* (L.) and *mangiferae* (F.) as well as all other species listed under *Cryptorhynchus* or *Cryptorrhynchus* in the recent Schenkling Catalogue (pt. 151, 1936, p. 216).

Notes and News in Entomology

Under this heading we present, from time to time, notes, news, and comments. Contributions from readers are earnestly solicited and will be acknowledged when used.

Tenth International Congress of Entomology

The Tenth Congress, held at Montreal, August 17th to 25th, was an outstanding success; it was an entomologically edifying as well as a thoroughly enjoyable experience. During the first half of the Congress, section meetings were held at McGill University. Here, the charming, shaded campus area served as a delightful informal gathering place at noon and at other times for those personal contacts and tete-a-tetes with entomologists from all corners of the world that made attendance at this Congress such a satisfying and rewarding experience. On Tuesday the Congress made an all-day excursion to Ottawa. During the remaining four days the large and more austere building of the University of Montreal provided the necessary meeting rooms, cafeterias, etc., all conveniently under one roof.

Preliminary figures kindly made available by the Secretary of the Congress, Mr. J. A. Downes, show an attendance of about 1400 members. The fact that ca. 300 of these were from overseas made this Congress a truly international one. The others were Americans and Canadians in a ratio of about 2:1. In addition, there were 200 more, mainly overseas members,

who could not come to Montreal, making a total registration of 1600. The number of scientific papers read exceeded 750, and the time consumed in giving them about 320 hours, with papers of course running concurrently in the various sections. The exhibits on display numbered 30, and the films 37.

In spite of the size of the Congress there was no confusion at any time and everyone was comfortable. Evidently the committee had foreseen every need, and had planned every detail with great care. We who attended wish to express our sincere gratitude to our Canadian hosts for the grand manner in which they provided for our needs and for our pleasure. Especially remembered is the memorable buffet supper atop Mount Royal and overlooking the city and harbor of Montreal; also the great banquet at the Hotel Windsor, and the other social gatherings, the vin d'honneur and the smokers, all provided without charge.

In order to give an idea of the proportional representation of the various fields of study we have counted up the number of papers as listed in the printed program in each section and compared it with the total number of 728 papers. Thus we obtained the following percentages:

Systematics	9.0	Forest. Ent.	6.5
Morph. & Anat.	3.9	Medical & Vet.	10.1
Physiol. & Tox.	12.1	Biol. Control	12.4
Behavior & Social	5.1	Apiculture	5.7
Ecology	5.5	Stored Products	3.0
Geogr. Distr.	5.8	Arachnida, etc.	2.3
Genetics & Cytol.	5.0	Paleontology	0.7
Agricultural	12.8		

The President of Congress, Dr. W. R. Thompson, has written a brief history of the Congresses (see: Canadian Entomologist 88(7): 285–289), and from this we learn that the first of these Congresses, at Brussels in 1910, came to be through the personal initiative of Dr. Karl Jordan of Tring. Since then Dr. Jordan has always had an active part in the organization of

these meetings, and we well recall him as one of the leading spirits of the Fourth Congress at Ithaca in 1928. This time, at Montreal, he was not able to be physically present; however, it was unthinkable that he should not take some active part, and this was made possible through a tape recording, and we heard his address in his own voice at the plenary session on Wednesday afternoon.

This brief report would not be complete if it omitted to state that American and overseas members alike were amazed and greatly impressed by the tremendous development of entomology in Canada during recent years, and by its high attainments. The stature of Canadian entomology was plainly evidenced by the prominent part Canadian entomologists took in so many of the meetings and symposia. They have made outstanding contributions in systematics, distribution (particularly in the Arctic region), physiology, genetics, behavior and other phases of pure entomology as well as in agricultural, forest and other subdivisions of applied entomology. An excellent account of the history and development of Canadian entomology may be found in an article compiled by Robert Glen and appearing in Canadian Entomologist 88(7): 290–371.—R. G. S.

Insect Taxonomy Project at the University of Michigan

The Dow Chemical Company has set up a project for the study of parasitic Hymenoptera at the University of Michigan, as a means of supporting basic research in the field of agriculture, with particular reference to the relation of chemical to natural control of insect pests. Dr. HENRY TOWNES is employed in the project and is working on revisions of the Nearctic Ichneumonidae. A study of the subfamily Metopiinae is nearing completion and a study of the Pimplinae is being started.

Review

ANATOMY OF THE HONEY BEE. By R. E. Snodgrass. Pp. xiv + 334, 107 text-figures. Comstock Publishing Associates, a division of Cornell University Press. Ithaca, New York, 1956. Price: $6.00.

"An insect is a living machine; no other animal is provided with so many anatomical tools, gadgets, or mechanisms for doing such a variety of things as is a winged insect."

With these words Dr. Snodgrass begins Chapter II (The Body Wall and the Muscles) in a book that proceeds to give a marvelously clear and concise account of all the various anatomical features of the bee, their structure, and how they function. For, although the preface disclaims an attempt to treat function—"the field of physiology is now best left to physiologists"—the author does indeed carefully describe the operation of the various gross anatomical and even of the microscopic parts that comprise the insect. It is evident that he has gone over carefully the mountain of recent literature with all its detailed data and has boiled down and refined all its profusion and confusion to the basic essential facts which he presents with amazing clarity and simplicity. The physiology that is omitted is that of metabolism, and cellular physiology generally.

Although it covers much the same ground, this book is not a mere revision of the 1925 "Anatomy and Physiology of the Honeybee." The arrangement is quite different, more attention is given to the immature stages, and a chapter on endocrine organs, unrecognized in 1925, has been added. Even where the data are still the same as they were 30 years ago, they are described in fresh, new language; literally every line is new. Many of the figures of the older book are used but all are newly engraved, and larger in size. Many new ones have been added. For example, in describing the mouth structures 67 separate drawings are used as compared with 24, for the legs 48 compared with 19 in the earlier book. Surprizingly, these additions do not make the reading more tedious but, on the contrary, much easier and more pleasant. While the descriptions of the

gross anatomy and the mechanics of the ectoskeletal parts have been perfected, the microscopic structures are also carefully explained, including the wax and other epidermal glands (with the "queen substance"), the sense organs, and even such microscopic details as the arrangement of the retinulae in the compound eyes that explains the ability of the insect to analyze polarized light.

Little space is given to theory as such; the impasse as regards the evolution of the head is very neatly told in a few words (p. 32): "most students of arthropod 'head segmentation' . . . contend that the cephalic lobe itself must have originally been formed by the union of several primitive segments . . . others interpret the embryonic cephalic lobe . . . as an unsegmented prostomium. If there was ever a stage in the evolution of arthropods when the cephalic lobe was segmented, the animals lived in remote Pre-Cambrian times and probably will never be brought to the witness stand." Thus, Dr. Snodgrass does not insist strongly on his own interpretation, and suggests that one cannot be sure. As we know, morphologists continue to debate the problem, somewhat as in a kind of parlor game in which each player selects certain of the available data and builds his own theory.

It should be stressed that this is not just a technical reference book on honey bee anatomy. It is far more, it is essentially a treatise on entomology, using one species as the example, and including a discussion of the fundamentals of embryology, development and metamorphosis as well as anatomy. The subject of each chapter is approached from the broadest evolutionary point of view, and its horizon includes all the arthropods and beyond, so that the bee really typifies animal life in general. Finally, the language of the book is such that it can be read straight through with pleasure, and with not too much skipping of details. It is a delight to follow the author through this complete examination of one insect: how it develops, how it grows and how it operates, for, as he says: "The anatomy of an animal is merely the machinery by which the animal lives. . . ."—R. G. Schmieder.

EXCHANGES

This column is intended only for wants and exchanges, not for advertisements of goods for sale or services rendered. Notices not exceeding three lines free to subscribers.

These notices are continued as long as our limited space will allow; the new ones are added at the end of the column, and, only when necessary those at the top (being longest in) are discontinued.

Conopidae of the World wanted. Will pay 10¢ to $1.00 for pinned and labelled specimens. S. Camras, 4407 N. Milwaukee Ave., Chicago 30, Illinois.

Anisoptera—Nearctic sp. wanted for exchange, espec. Ophiog., Arigom., Aeschna, Neurocor., Somatoc., Cordulia, Dorocor., Leucor. R. D. Cuyler, Dept. of Entomology, N. C. State College, Raleign, N. C.

Bembicini and Stizini (Hym., Sphec.) of New World wanted for revis. study. Will return upon request or at end of project. James E. Gillaspy, Dept. of Zoology, Univ. Texas, Austin 12, Texas.

Agapema galbina. Will exchange cocoons of this moth for nature books. E. Frizzell, Route 4, Box 96, San Benito, Texas.

Wanted—Data on exact location of colonies of *Epibembex* (olim *Bembix*) (Hymenoptera), any species, any part of country, for biological studies. Howard E. Evans, Dept. Entomology, Cornell Univ., Ithaca, N. Y.

Fanniinae wanted on loan (nearctic and holarctic), and information on collections. James G. Chillcott, Dept. Entom., Univ. of Kansas, Lawrence, Kan. (Loans may be charged to Dr. C. D. Michener.)

Tenebrionidae of the World wanted, in exchange for insects of Argentina and neighboring countries. Horacio J. Molinari, Av. Lib. Gral. San Martin 55, Acassuso (Buenos Aires), Rep. Argentina.

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